SECTION 26 35 26
HARMONIC FILTERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of harmonic mitigation filter equipment, indicated as filters in this section.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and for providing a low impedance path for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

1.3 QUALITY ASSURANCE

A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with drawings and specifications.
   b. Include electrical ratings, dimensions, weights, mounting details and materials, terminations, and connection diagrams.
   c. Complete nameplate data including manufacturer’s name and catalog number.
2. Manuals:
   a. When submitting the shop drawings, submit companion copies of complete maintenance and operating manuals including technical data sheets and wiring diagrams.
   b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certification: Two weeks prior to the final inspection, submit the following.
   a. Certification by the manufacturer that the filters conform to the requirements of the drawings and specifications.
   b. Certification by the Contractor that the filters have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. Institute of Electrical and Electronics Engineers (IEEE):
519-92.....Harmonic Control in Electrical Power Systems
1100-05.....Powering and Grounding Electronic Equipment

C. International Code Council (ICC):
IBC-12.....International Building Code

D. National Fire Protection Association (NFPA):
70-11.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):
508-99.....Industrial Control Equipment

PART 2 - PRODUCTS

2. ACTIVE HARMONIC FILTER

A. Provide each nonlinear load as shown on drawings with a three-phase, four-wire external harmonic filter with the following requirements:
   1. The filter shall treat low frequency harmonics (3rd, 5th, 7th, 11th, 13th, etc.) by microprocessor-controlled active power electronics which switch the AC power to control the output.
   2. Touchscreen display shall show harmonic spectrum data, line voltage and current, harmonic current, and reactive current, at a minimum.
   3. kVA rating, A and V ratings of the filter shall be as shown on drawings.
   4. Current transformer(s)of a type, configuration and ratio to suit sensing and mounting conditions shall be supplied.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The filters shall be installed and connected in accordance with the approved shop drawings and manufacturer's instructions.

3.2 ACCEPTANCE CHECKS AND TESTS

A. An authorized representative of the filter manufacturer shall technically supervise and participate during all of the field tests. The manufacturer’s representative shall certify in writing that the equipment has been installed and tested in accordance with the manufacturer’s recommendations.

B. Perform manufacturer’s required field tests in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:
    a. Compare equipment nameplate data with specifications and approved shop drawings.
    b. Inspect physical, electrical, and mechanical condition.
    c. Verify appropriate anchorage, required area clearances, and correct alignment.
    d. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey after energization.
    e. Verify grounding connections.
    f. Verify current transformer connections.
    g. Vacuum-clean filter enclosure interior. Clean filter enclosure exterior.
    h. Verify the correct operation of all indicating devices.
    i. Use a three-phase harmonic analyzer to measure voltage and current total harmonic distortion levels, with filter connected to and disconnected from the bus using the circuit protective device.
    j. Check doors for proper alignment and operation.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that the filters are in good operating condition and properly performing the intended function.

3.4 INSTRUCTION

A. Furnish the services of a factory-trained technician for one 2-hour training period for instructing personnel in the maintenance and

operation of the filters, on the date requested by the Contracting Officer Representative.

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